Reducing Fossil Fuel Dependence and Greenhouse Gas Emissions in Agriculture

PROBLEM: Experts have estimated that it takes 8-10 units of air polluting fossil energy to put 1 unit of food energy on American tables. It has also been estimated that it takes the equivalent of 10 barrels of oil per year to feed every person in the country. Approximately 30% of the fossil energy in agriculture is used to make fertilizer, 20% is used to fuel farm machinery, another 16% is used for transportation and 13% is used for pumping water. As the realities of declining fossil fuel supplies and Climate Change become apparent, Californians will face many challenges in the rising cost of mobility and energy but the most important challenge may be to maintain an affordable and nourishing food supply.

PREVIOUS WORK: California has a vibrant history of small farms growing food for local markets. It also has a history of innovation with farm machinery, electric vehicles and solar energy. The primary researcher has been using tractors on his homestead for over 30 years. He has built solar chargeable electric vehicles including, 4 electric Porsche Spyders and 7 electric farm tractors. He has also personally installed over 100 kWs of photovoltaic roofing and spent the last 7 years as Director of Building Integrated Photovoltaic (BIPV) Products for the largest flexible thin-film PV manufacturer in the world.

OBJECTIVE: Research and develop an electric tractor that will perform all the mechanized tasks required to maintain and improve the productivity on a small farm without using fossil fuel. To also develop PV shade canopies, solar charging sheds for fast battery exchange and PV roofing specifically designed for barns and other out buildings.

DESCRIPTION: Build at least 4 electric tractors and compare them with each other and current technology under actual farm conditions. Categories of analysis will include: Cost, Efficiency, Run Time, Traction/Compaction, Maneuverability, Width Adjustment, Clearance/Cultivation, Planting/Harvesting, and the ability to use Loader, Backhoe or other implements. Also build and test at least 4 solar charging devices for on-board charging and off-board charging of quick change battery packs for continuous operation. Integrate and test on-board grid interactive inverters to turn tractor into a mobile AC power source and backup power supply, as well as take advantage of low night time charging rates. The multi-year proposal would test the solar tractors in as large a variety of applications and conditions as possible to assure continuous feedback and improvement.

BENEFITS: Harmful emissions can be eliminated from agriculture by using renewably charged farm equipment. Setting up manufacturing and sales of such farm equipment in California will boost the economy, bring much needed jobs and make small farms impervious to rising fuel costs.

COST: The prototype tractors with solar charging stations will cost between $25,000 and $50,000 each. The cost of the multi year testing and improvement program is estimated at $200,000 for a total cost of approximately $400,000 including overhead. The cost of manufacturing the tractors in the volume necessary to achieve zero emission food production in California is $10,000 – $15,000 for the tractors and $4,000 - $20,000 each for the solar charging infrastructure.

COFUNDING/COLLABORATION OPPORTUNITIES: The Post Carbon Institute is already in the process of purchasing two of the electric tractors built by the primary researcher in the early '90s and is very interested in co-funding and collaboration opportunities. University agricultural extensions and State and County farming organizations would be excellent collaborators and possible sources of co-funding. The primary researcher has contacts with small farmers and small farm organizations (farm orgs) from around the world that have shown interest in purchasing solar charged electric tractors since he started development work in 1993. He believes that a portion of the prototype cost would be co-funded by small farmers and farm orgs that would like to collaborate on development work but do not have all the funds for prototypes.
The primary researcher will guarantee a 51% cost share as long as he can retain the intellectual property that he develops. Information on the suggested primary collaborators can be found at: *www.postcarbon.org* |*www.globalpublicmedia.com* | *www.relocalize.net* |*www.energyfarms.net* | *www.oildepletionprotocol.org* | *www.postcarboncities.net* | www.solarliving.org | www.coastlocalize.org

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